LEBEDEV, N. N.

2

1

Aluminum chloride in organic chemistry. N. N. Lebedev. *Uspekhi Khim.* 21, 1399-1471(1952).—Review with 565 references.
G. M. Kosolapoff

LEBEDEV, N. N.

USSR/Chemistry

Card 1/1

Authors : Lebedev, N. N.

Title : Mechanism of the catalytic effect of aluminum chloride. Part 3.- Kinetics of reaction of benzene alkylation.

Peroidical : Zhur. Ob. Khim. 24, Ed. 4, 664 - 670, April 1954

Abstract : The author developed a method and investigated the kinetics of reaction of cyclohexylchloride with benzene in the presence of aluminum chloride in the benzene and nitrobenzene mixtures. The reaction is monomolecular in regard to the alkyl halide and benzene but has an intermediate order of from o.5 to 2 with regard to aluminum chloride depending upon the composition of the medium. Medium shows strong effect on rate of reaction. Obtained results were explained by existence of two mechanism: rapid reaction of the ion catalysis in strongly ionizing solvents and slow reaction of bimolecular catalysis in weakly ionizing medium. Eight references; 5 USSR since 1906; 2 USA since 1903; 1 German 1935. Tables, graphs.

Institution : The D. I. Mendeleyev Chemical Technological Institute in Moscow.

Submitted : July 20, 1953

Lebedev, N.N.

USSR.

Mechanism of the catalytic action of aluminum chloride. III. Kinetics of the reaction of alkylation of benzene. N. N. Lebedev. *J. Gen. Chem. U.S.S.R.* 24, 673-8 (1954) (Engl. translation).—See *C.A.* 48, 10413g. H. L. H.

LEBEDEV, N.N.

Catalytic action of diamond [illegible]

[illegible]

LEBEDEV, N.N.

USSR/Chemistry - Alkylation

Card 1/1 Pub. 151 - 15/37

Authors : Lebedev, N. N.

Title : Mechanism of the catalytic effect of $AlCl_3$. Part 4.- Kinetics and mechanism of alkylation reaction of benzene with olefines

Periodical : Zhur. ob. khim. 24/10, 1782-1787, Oct 1954

Abstract : The rate of reaction of cyclohexene with benzene in the presence of aluminum chloride was established to be a constant value not depending upon the time of reaction nor concentration of the cyclohexene but rather directly proportional to the $AlCl_3$ concentration. The actual alcylating medium during the reaction of olefines with aromatic hydrocarbons in the presence of $AlCl_3$ was found to be the alkyl halide formed by attaching itself to the olefine of the hydrogen halide. The effect of hydrogen chloride on the rate of reaction is explained. Nine references: 6-USSR; 1-USA; 1-English and 1-German (1884-1954). Tables; graphs.

Institution : The D. I. Mendeleyev Chemical-Technological Institute, Moscow

Submitted : May 10, 1954

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R000929020009-0"

LEBEDEV, N.N.

4002

Chem

Preparation of some halogen derivatives by addition of hydrogen halide to unsaturated compounds. N. N. Lebedev. J. Gen. Chem. U.S.S.R. 24, 1025-7 (1954) (Engl. translation).—See C.A. 49, 13870g. B. M. R.

1 M. A. YOUTZ
3 copies

BM

Preparation of some halogen derivatives by addition of hydrogen halide to unsaturated compounds. N. N. Lebedev (D. I. Mendeleev Chem.-Technol. Inst., Moscow). *Zhur. Obshchei Khim.* 24, 1959-61(1954).—It was shown that the $PhNO_2$ complex with $AlCl_3$ cannot decomp. halogen derivs. into an olefin and hydrogen halide. This permitted a new method of prepn. of some halides by addn. of HX to unsatd. compds. Thus, into 50 ml. 10% soln. of $AlCl_3$ in $PhNO_2$ were passed simultaneously streams of dry $CH_2:CHCl$ and HCl so that the latter was always in 5-10% excess, while the reaction vessel was cooled with tap water. After treatment of the mixt. with dil. HCl there was obtained up to 85% $MeCHCl_2$, b. 56-8°. Similar reaction with $CH_2:CCl_2$ and HCl readily gave 75% $MeCCl_3$, b. 73-5°. Propylene gave 80% iso-PrCl or 70% iso-PrBr; $CH_2:CHCH_2Cl$ gave 65% $MeCHClCH_2Cl$; 60% $MeCHBrCH_2Br$ was prepd. from $CH_2:CHCH_2Br$, while 70% MeEtCHCl was obtained from $CH_2:CHEt$. G. M. Kosolapoff

LEBEDEV, N.N., dotsent.

Thirty-fifth anniversary of the Mendeleev Institute of Chemical Technology in Moscow. Khim.prom. no.8:497 D '55. (MLRA 9:5)

1. Zamestitel' direktora po nauchnoy rabote.
(Moscow--Technical education)

LEBEDEV N.N.

Preparation and polymerization [illegible]

[illegible]

LEBEDEV, N. N.

LEBEDEV, N. N.: "Investigation of problems of the kinetics and reactivity in the alkylation of aromatic compounds in the presence of aluminum chloride." Min Higher Education USSR. Leningrad Technological Inst imeni Leningrad Soviet. Leningrad, 1956. (Dissertation for the Degree of Doctor in Chemical Sciences).

Knizhnaya letopis', No. 39, 1956. Moscow.

LEBEDEV, N.N.

LEBEDEV, N.N.

[Studies in problems of kinetics and reactivity during alkylation of aromatic compounds in the presence of aluminum chloride. Abstract of a dissertation offered for the degree of doctor of chemical sciences] Issledovanie voprosov kinetiki i reaktsionnoi sposobnosti pri alkilirovanii aromaticheskikh soedinenii v prisutstvii khloristogo aliuminiia. Avtoreferat dissertatsii, predstavlennoi na soiskanie uchenoi stepeni doktora khimicheskikh nauk. Leningrad, M-vo vysshego obrazovaniia SSSR, 1956. 19 p. (MLRA 10:9)

(Alkylation) (Aromatic compounds) (Aluminum chloride)

LEBEDEV, Nikolay Nikolayevich (Mos Chemico-Technol Inst imeni Mendeleyev) awarded sci degree of Doc Chem Sci for the 19 Mar 57 defense of dissertation: "Research into questions of kinetics in reaction capabilities upon alkylation of aromatic compounds in the presence of aluminum chloride" at the Council, Leningrad Technol Inst imeni Lensovet; Prot No 11, 10 May 58.

(BMVO, 10-58,20)

LEBEDEV, N.N.

Mechanism of the catalytic action of aluminum chloride. Part 5:
Reaction capacity of aromatic compounds during allcylation.
Zhur. ob. khim. 27 no.9:2460-2469 S '57. (MIRA 11:3)

1.Moskovskiy khimiko-tekhnologicheskiy institut.
(Aromatic compounds) (Aluminum chloride)
(Alkylation)

SOV 156-58-1-25/46

AUTHORS: Lebedev, N. N., Baltadzhi, I. I.

TITLE: The Influence Exercised by the Reactivity of Chlorine Derivatives on the Relative Alkylation Velocity of Toluene and Benzene (Vliyaniye reaktsionnoy sposobnosti khlorproizvodnykh na otnositel'nyye skorosti alkilirovaniya toluola i benzola)

PERIODICAL: Nauchnyye doklady vysshey shkoly, Khimiya i khimicheskaya tekhnologiya, 1958, Nr 1, pp. 104 - 109 (USSR)

ABSTRACT: The velocities mentioned in the title differed in the case of various authors (Refs 1-7) according to the character of the alkylating agent and the reaction conditions (1,64 - 4,85). The authors wanted to explain in the present paper the problem mentioned in title under retention of the other conditions. This problem mentioned in the title is insufficiently investigated and the final conclusions hitherto drawn are disputed. This problem is, however, theoretically especially interesting, since it is assumed that the more active aggressive agents have a reductive selectivity in the substitution (Ref 8). Therefore the relative reactivity of toluene and benzene and the relation of the developing polymers $\frac{p-}{m-}$ are assumed to be lower than in

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The Influence Exercised by the Reactivity of Chlorine SOV/156-58-1-25/46
Derivatives on the Relative Alkylation Velocity of Toluene and Benzene

the case of less active reagents. The alkylation reaction is a sample problem useful for the rechecking of this assumption. The reactivity of the substituents may vary to a great extent, whereas the reaction conditions are maintained unchanged. Isopropyl chloride, tert. butyl chloride, benzyl chloride, benzyl, p-chlorine-benzyl chloride, finally m- and p-xylyl chlorides were chosen as alkylating agents. The reactivity of the extreme members differs by a factor of 1000 (Ref 4). The method of the experiments is described. The results of a direct measurement of the velocity constants are compiled in the table. The obtained results are compared to the reactivity of the chlorine derivatives in table 3. At first sight no definite dependence of the relative alkylation velocity of toluene and benzene on the reactivity of the chlorine derivatives seems to exist. If, however, the homologous chlorine derivatives alone are observed (tert.-butyl chloride > isopropyl chloride > p-xylyl chloride > m-xylyl chloride > benzyl chloride), it becomes obvious that in this case the higher activity of the alkylating agent causes also a greater difference of the reactivity of toluene and benzene. Thus a rule was found which is contrary

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The Influence Exercised by the Reactivity of Chlorine Derivatives on the Relative Alkylation Velocity of Toluene and Benzene SOV/156-58-1-25/46

to that of Brown (Braun, Ref 8). The authors succeeded in finding this under completely equal conditions, whereas Brown did not pay attention to the last circumstance. The greatest difference of the relative reaction velocity of toluene and benzene is thus observed not in the case of the less active substituting agents, but on the contrary in the case of the more active ones. The authors explained the rule found by them by the polarization of the aromatic nucleus at the time of the reaction. There are 1 figure, 3 tables, and 9 references, 3 of which are Soviet.

ASSOCIATION: Moskovskiy khimiko-tekhnologicheskiy institut im.D.I.Mendeleyeva (Moscow Institute of Chemical Technology imeni D.I.Mendeleyev)

SUBMITTED: September 17, 1957

Card 3/4

The Influence Exercised by the Reactivity of Chlorine SOV/156-58-1-25/46
Derivatives on the Relative Alkylation Velocity of Toluene and Benzene

Card 4/4

SOV/ 156-58-3-30/52

AUTHORS: Baltadzhi, I. I., Lebedev, N. N.

TITLE: The Influence of the Activity of the Exchange Component on the Relative Rates of Alkylation of Benzene and Chlorobenzene (Vliyaniye aktivnosti zameshchayushchego agenta na otnositel'-nyye skorosti alkilirovaniya benzola i khlorbenzola)

PERIODICAL: Nauchnyye doklady vysshey shkoly, Khimiya i khimicheskaya tekhnologiya, 1958, Nr 3, pp. 521 - 525 (USSR)

ABSTRACT: The influence exerted by the activity of the exchange group on the relative rates of alkylation of benzene and chlorobenzene was investigated. The alkylation reaction was carried out in the presence of aluminium chloride. The rate of alkylation of benzene and chlorobenzene increased parallel to the rate of the reaction of the alkylating agents. The alkylating agents can be classified according to their reactivity as follows: n-xylyl chloride > m-xylyl chloride > benzyl chloride, 3-butyl chloride > isopropylchloride. The dependence of the reactivity of toluene and chlorobenzene on various alkylation agents was determined. The authors found a linear relationship between the logarithms of the relative rates of alkylation of benzene

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The Influence of the Activity of the Exchange SOV/156-58-3-30/52
Component on the Relative Rates of Alkylation of Benzene and Chlorobenzene

and chlorobenzene in the case of many alkylating agents. It was shown that the exchange agent influences the reactivity of the aromatic nucleus not only by the polarization effect but also by the occurrence of the coupling effect. There are 1 figure, 4 tables, and 7 references, 2 of which are Soviet.

ASSOCIATION: Moskovskiy khimiko-tekhnologicheskiy institut im.D.I.Mendeleyeva (Moscow Chemical and Technological Institute imeni D.I.Mendeleyev)

SUBMITTED: October 26, 1957

Card 2/2

79-28-5-5/69

AUTHOR: Lebedev, N. N.

TITLE: On the Mechanism of the Catalytic Action of Aluminum Chloride (O mekhanizme kataliticheskogo deystviya khloristogo alyuminiya)
VI. Further Data on the Kinetics and the Mechanism of the Alkylation Reaction of Benzene With Chlorine Derivatives (VI. Yeshche o kinetike i mekhanizme reaktsii alkilirovaniya benzola khloroproizvodnymi)

PERIODICAL: Zhurnal Obshchey Khimii, 1958, Vol. 28, Nr 5, pp. 1151-1160 (USSR)

ABSTRACT: After the publication of one of his earlier papers (Reference 1) the author had the opportunity to obtain knowledge of the works by Brown (Braunai) and Grayson (Greysona) (Reference 2) who investigated the kinetics of the alkylation reaction of benzene by means of some halogen derivatives in the same solvent used by them, nitrobenzene. They proved the monomolecular character of the reaction with respect to the halogen derivative and the aromatic compound, but with respect to the ac-

Card 1/3

On the Mechanism of the Catalytic Action of Aluminum Chloride. 79-28-5-5/69
VI. Further Data on the Kinetics and the Mechanism of the Alkylation Reaction of Benzene With Chlorine Derivatives

tion of the reaction of aluminum chloride and of the solvents, they obtained results which differed strongly from those of the author. The use of methylcyclohexane or benzene in place of 60% nitrobenzene in the experiments of these authors did not result in any essential change of the reaction velocity, the latter having been proportional to the concentration of aluminum chloride. In view of the necessity to find the reasons for the discrepancy of the strongly differing results as well as in view of the important role which the above mentioned data play in explaining the mechanism of the reaction the author decided to deal most detailed with this problem. He found that the alkylation reaction of aromatic compounds by means of halogen derivatives is of variable order with respect to aluminum chloride and that it depends on the kind of solvent, which also exerts at the same time influence on the reaction velocity. Thus, the author main-

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On the Mechanism of the Catalytic Action of Aluminum Chloride. 79-28-5-5/69
VI. Further Data on the Kinetics and the Mechanism of the Alkylation Reaction of Benzene With Chlorine Derivatives

tains, that the data by Brown and Grayson do not correspond to reality. A further basis for the ionic- and molecular mechanisms of catalysis by means of aluminum chloride was given.
There are 4 figures, 7 tables and 14 references, 7 of which are Soviet.

ASSOCIATION: Khimiko-tekhnologicheskiy institut imeni D. I. Mendeleyeva (Chemical-Technological Institute imeni D. I. Mendeleyev.)

SUBMITTED: April 24, 1957

Card 3/3

88537

S/190/60/002/010/007/026
B004/B054

5.3832

AUTHORS: Yegorova, Yu. V., Korshak, V. V., Lebedev, N. N.

TITLE: Heterochain Polymers. XXIX. Some Rules Governing the Interfacial Polycondensation of Acid Dichlorides With Hydroquinone

PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 10, pp. 1475-1480

TEXT: The authors studied the interfecial polycondensation of adipyl dichloride and terephthalyl dichloride with hydrcqinone. The acid chlorides were dissolved in toluene, the hydroquinone in alkaline water, and the two solutions were thoroughly mixed. The reaction with adipyl dichloride proceeded so fast that no chlorine was detected in the organic phase after 2-3 min. With terephthalyl dichloride, the yield was determined as a function of the reaction time (Fig. 1). Further, the effect of temperature was determined for this reaction; a maximum was found at 45°C (Fig. 2). The concentration of components has little effect on the yield. 0.5-1.0 moles/l is indicated as optimum value. Fig. 3 shows that the yield is much dependent on the NaOH concentration. The optimum concentration of

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Heterochain Polymers. XXIX. Some Rules Governing the Interfacial Polycondensation of Acid Dichlorides With Hydroquinone

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the alkali does not correspond to the concentration equivalent to hydroquinone (1:2), but it lies for adipyl chloride at an excess of 1 mole/l, for terephthalyl dichloride at an excess of 0.5 mole/l. The maximum intrinsic viscosity lies at the same alkali concentrations at which the maximum yield is obtained. Further, the authors determined the yield as a function of the ratio of the two components (Figs. 4, 5). A maximum yield of 45% was obtained from adipyl dichloride at 60% hydroquinone excess, and a yield of 85% was obtained from terephthalyl dichloride. An attempt at producing a polymer from methyl phosphinyl chloride and hydroquinone in the same manner was unsuccessful. The authors discuss the experimental data and explain them by a competition of the reaction of chlorides and polymer molecules among one another, and with hydroxyl- and phenolate ions, where the reactivity of the chloride, the concentration, and kinetic factors are of importance. A paper by V. V. Korshak, S. V. Vinogradova, and A. S. Lebedeva is mentioned. There are 5 figures and 3 references: 2 Soviet and 1 US.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy AN SSSR (Institute of Elemental-organic Compounds of the AS USSR)

SUBMITTED: April 12, 1960

Card 2/2

4

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69672
S/153/60/003/01/027/058
B011/B005

AUTHORS: Lebedev, N. N., Smirnova, M. M.

TITLE: On the Kinetics of the Reaction of Ethylene Oxide With Aniline

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Khimiya i khimicheskaya tekhnologiya, 1960, Vol 3, Nr 1, pp 104-108 (USSR)

TEXT: The authors ascertained in their paper that the reaction of ethylene oxide with aniline is of 1st order with respect to ethylene oxide. The catalytic effect of water is proportional to its concentration. The reaction was carried out in aniline medium which was one of the reagents at the same time. The reaction process was observed by a diaphragm pressure gage (Ref 4). The velocity constant of the reaction was graphically calculated from the tangens of the angle of inclination of the straight line log Δ p,time where Δp is the difference between the pressure at a given moment and the pressure after the end of reaction. The difference Δp proved to be proportional to the ethylene-oxide concentration. The first reaction order with respect to ethylene oxide was ascertained by experiments with various initial concentrations of ethylene oxide at 70° (Table 1). The influence of water on the reaction rate was studied at 100° and an initial ethylene-oxide concentration of 0.5 mol/l (Fig 1). Acids, particularly picric acid, have also a catalytic effect on the reaction (Fig 2),

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On the Kinetics of the Reaction of Ethylene Oxide With Aniline

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This catalytic action was - as in the case of water - proportional to the acid concentration but the catalytic constant was 170 times higher than that of water. The authors' experiments proved the catalytic action of 2,4-dinitrophenol, p-nitrophenol, acetic acid, formic acid, p-toluene-sulfonic acid, and perchloric acid (Table 2). In this case, however, due to the low concentration, the catalytic influence of phenol and o-nitrophenol was not observed, while at other occasions it was very distinct. Figure 3 shows that the catalytic constant is the higher, the stronger is the acid. Figure 4 shows the temperature influence on the rate of a noncatalyzed reaction, and of a reaction catalyzed with picric acid of ethylene oxide with aniline. The activation energies were calculated from these data. From the data obtained, the authors draw conclusions concerning the reaction mechanism. Figure 3 shows that the catalytic action of acids is not proportional to their dissociation degree or the concentration of hydrogen ions. This is obviously a case of general acid catalysis. A nondissociated molecule of the acid itself and an acidic ion $C_6H_5NH_3^+$ are taking part in it. The formation of the latter explains the catalytic effect of water (see Scheme). The authors indicate a general kinetic equation for the process. The first stage of the reaction is based on the activation of the ethylene-oxide molecule. The re-

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On the Kinetics of the Reaction of Ethylene Oxide With Aniline

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grouping of the electrons in the activated molecule weakens the C—O bond; a partial, in the extreme case even a complete, positive charge appears on the carbon atom. Further, there is an interaction of this ion with the aniline molecule with subsequent separation of a proton. There are 4 figures, 2 tables, and 5 references, 2 of which are Soviet.

4

ASSOCIATION: Moskovskiy khimiko-tekhnologicheskiy institut im. D. I. Mendeleyeva (Moscow Institute of Chemical Technology imeni D. I. Mendeleyev)

SUBMITTED: March 17, 1959

Card 3/3

LEBEDEV, N.N.; BALTADZHI, I.I.; KOZLOV, V.

Effect of the activity of catalysts on the relative reactivity of toluene and benzene during chlorination. Zhur. VKHO 5 no. 2:236-237 '60. (MIRA 14:2)

1. Moskovskiy khimiko-tekhnologicheskiy institut imeni D.I. Mendeleyeva.
(Toluene) (Benzene) (Chlorination)

MIKHAYLENKO, Yu.Ya.; LEBEDEV, N.N.; KOLCHIN, I.K.

Determination of the isomers of cymene and tert.butyltoluene by infrared absorption spectra. Zhur.anal.khim. 15 no.2:159-162 Mr-Ap '60. (MIRA 13:7)

1. Moskovskiy khimiko-tekhnologicheskiy institut im. D.I. Mendeleyeva.
(Cymene--Spectra) (Toluene--Spectra)

S/075/60/015/004/023/030/XX
B020/B064

AUTHORS: Mikhaylenko, Yu. Ya., Lebedev, N. N., Kolchin, I. K., and Kutyrina, Ye. G

TITLE: Analysis of Multicomponent Mixtures From Infrared Absorption Spectra. Information 2. Determination of the Isomers of Chloro Cumenes, Tertiary Butyl Benzenes, and Chloro Diphenyl Methanes

PERIODICAL: Zhurnal analiticheskoy khimii, 1960, Vol. 15, No. 4, pp. 495 - 499

TEXT: The analysis is described in detail in the previous publication of this series (Ref. 1). The spectrophotometer ИКС-11 (IKS-11) was used with bulbs of sylvine 0.09 cm thick and with specially purified carbon disulfide as a solvent (Ref. 2). Calibration was made by determining the extinction coefficients of every aromatic compound for every wavelength used. The o-, m-, and p-isomers of chloro cumene, tertiary butyl chloro benzene, and chloro diphenyl methane

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Analysis of Multicomponent Mixtures From Infrared Absorption Spectra. Information 2. Determination of the Isomers of Chloro Cumenes, Tertiary Butyl Benzenes, and Chloro Diphenyl Methanes

S/075/60/015/004/023/030/XX
B020/B064

were used for calibration. Chloro cumene and butyl chloro benzene were obtained by the Grignard reaction from the respective bromo-chloro benzene isomer and alkyl bromide, using n-heptane instead of absolute ether as a solvent (Ref. 3). The chloro diphenyl methane isomers resulted from the condensation of the respective chloro benzyl chloride with benzene in the presence of $AlCl_3$. The constants of the compounds are given in Table 1. First, all compounds were qualitatively analyzed to determine the absorption maxima of the isomers. To find the absorption bands of the individual isomers, the data published on disubstituted benzene derivatives were used, i.e. the band at 770 - 740 cm^{-1} is characteristic of the ortho-disubstituted derivatives, the bands at 800 - 770 cm^{-1} and 710 - 690 cm^{-1} of the meta-disubstituted derivatives, and the band at 833 - 780 cm^{-1} of the para-disubstituted derivatives (Refs. 8, 9). Figs. 1, 2, and 3

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S/075/60/015/004/023/030/XX
B020/B064

Analysis of Multicomponent Mixtures From Infrared Absorption Spectra. Information 2. Determination of the Isomers of Chloro Cumenes, Tertiary Butyl Benzenes, and Chloro Diphenyl Methanes

show the absorption spectra of the chloro-alkyl benzene isomers studied. The absorption band lying in the range for p-, m-, and o-disubstituted benzenes are obtained on the curves. The wavelengths most convenient for determining the isomers are given. Moreover, the absorption curves show absorption maxima at 1037 and 1100 cm^{-1}, which may be due to the vibrations of the benzene cycle (Ref. 9). The optical density of each compound in CS_2 solution was measured, and the extinction coefficients were calculated for each wavelength. Tables 2, 3, and 4 give the results. Since the Lambert - Beer law does not hold for the solutions examined, it was necessary to employ the method of successive approximations in determining the composition of mixtures just as in Ref. 1. The results of an analysis of artificial mixtures showed that the mean error is approximately 4%. There are 3 figures, 4 tables, and 10 references: 4 Soviet, 2 German, 3 US, and 1 French.

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Analysis of Multicomponent Mixtures From Infrared Absorption Spectra. Information 2. Determination of the Isomers of Chloro Cumenes, Tertiary Butyl Benzenes, and Chloro Diphenyl Methanes

S/075/60/015/004/023/030/XX
B020/B064

ASSOCIATION: Moskovskiy khimiko-tekhnologicheskiy institut im D. I. Mendeleyeva (Moscow Institute of Chemical Technology imeni D. I. Mendeleyev)

SUBMITTED: September 13, 1958

Card 4/4

LEBEDEV, N.N.; BALTADZHI, I.I.

Kinetics and reactivity during the halogenation of aromatic compounds in the presence of metal halides. Part 1: Chlorination with ferric chloride as the catalyst. Kin. i kat. 2 no.2:197-204 Mr-Ap '61. (MIRA 14:6)

1. Moskovskiy khimiko-tekhnicheskiy institut imeni D. N. Mendeleyeva.
(Chlorination)
(Benznene)

LEBEDEV, N.N.; SMIRNOVA, M.M.

Reactions of α-oxides. Part 1: Kinetics of the reaction of ethylene oxide with cyclohexylamine in various solvents. Kin.i kat. 2 no.4:519-524 Jl-Ag '61. (MIRA 14:10)

1. Moskovskiy khimiko-tekhnologicheskiy institut imeni D.I.Mendeleyeva.
(Ethylene oxide) (Cyclohexylamine)

~~LEBEDEV, N.N.;~~ GUS'KOV, K.A.

Reactions of oxides. Part 2: Kinetics of the reaction of ethylene oxide with acetic and monochloracetic acids. Kin.i kat. 4 no.1:116-127 Ja-F '63. (MIRA 16:3)

1. Moskovskiy khimiko-tekhnologicheskiy institut imeni Mendeleyeva.
(Ethylene oxide) (Acetic acid) (Chemical reaction, Rate of)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R000929020009-0"

LEBEDEV, N.N.; GUS'KOV, K.A.

Reactions involving α -oxides. Part 3: Kinetics of secondary reactions in the interaction between ethylene oxide and acetic acid. Kin. i kat. 4 no.4:581-588 Jl-Ag '63. (MIRA 16:11)

1. Moskovskiy khimiko-tekhnologicheskiy institut imeni D.I.Mendeleyeva.

LEBEDEV, N.N.; BALTADZHI, I.I.

Kinetics and reactivity in the halogenation of aromatic compounds in the presence of metal halides. Part 2: Chlorination of benzene in the presence of aluminum, tin, and titanium chlorides. Kin. i kat. 4 no.6:886-891 N-D '63. (MIRA 17:1)

1. Moskovskiy khimiko-tekhnologicheskiy institut imeni Mendeleyeva.

LEBEDEV, N.N.; BALTADZHI, I.I.

Kinetics and reactivity of aromatic compounds in the course of halogenation in the presence of metal halides. Part 3: Reactivity of aromatic compounds. Kin. i kat. 5 no.2:305-310 Mr-Ap '64. (MIRA 17:8)

1. Moskovskiy khimiko-tekhnologicheskiy institut imeni Mendeleyeva.

LEBEDEV, N.N.; GUS'KOV, K.A.

Reactions involving α-oxides. Part 4: Acid catalysis and the intermediate compounds yielded by the reaction of ethylene oxide with carboxylic acids. Kin. i kat. 5 no.3:446-453 My-Je '64. (MIRA 17:11)

1. Moskovskiy khimiko-tekhnologicheskiy institut imeni Mendeleyeva.

LEBEDEV, N.N.; SHVETS, V.F.

Reactions of α-oxides. Part 6: Kinetics of the reaction of ethylene oxide with benzenesulfamide. Kin.i kat. 5 no.6:989-995 N-D '64. (MIRA 18:3)

1. Moskovskiy khimiko-tekhnologicheskiy institut imeni Mendeleyeva.

LEBEDEV, N.N.; SHVETS, V.F.

Reactions of α-oxides. Part 8: Reaction kinetics of ethylene oxide with phenols and the reactivity of phenols in this reaction. Kin.i kat. 6 no.5:782-791 S-O '65. (MIRA 18:11)

1. Moskovskiy khimiko-tekhnologicheskiy institut imeni Mendeleyeva.

L 38531-66 EWT(m)/EWP(j) WW/JW/RM

ACC NR: AP 6019941 (A) SOURCE CODE: UR/0366/66/002/002/0261/0265

AUTHOR: Lebedev, N. N.; Kozlov, V. M. 36

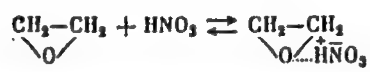
ORG: Moscow Chemical Engineering Institute im. D. M. Mendeleyev (Moskovskiy khimiko-tekhnologicheskiy institut) 12

TITLE: Kinetics and mechanism of the reaction of ethylene oxide with acids

SOURCE: Zhurnal organicheskoy khimii, v. 2, no. 2, 1966, 261-265

TOPIC TAGS: ethylene oxide, nitric acid, chemical reaction kinetics, reaction mechanism

ABSTRACT: The kinetics of the reaction of ethylene oxide with nitric acid were studied in dioxane solution. The reaction rate was measured manometrically in the presence of excess acid and titrimetrically in the presence of excess oxide. The reaction order was found to change from first (excess C_2H_4O) to second (excess HNO_3). An appreciable range exists where the reaction orders are intermediate with respect to the acid and where the process takes place via both mechanisms. The first stage of the reaction is the formation of a complex by a reversible acid-base interaction:



Card 1/2 UDC: 547.715

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ACC NR: AP 6019941

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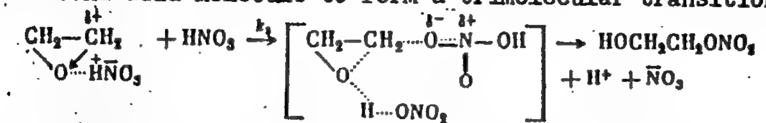
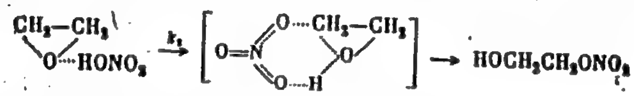
In the reaction which is second order with respect to the acid, the complex is attacked by a second acid molecule to form a trimolecular transition state:



If there is not enough acid, the formation of a cyclic complex is thought to occur:



Two kinetic equations are proposed for the reaction:

$$-\frac{dx}{d\tau} = k_3 K_p \left[\begin{array}{c} CH_2-CH_2 \\ \diagdown O \diagup \end{array}\right] [HNO_3]^2,$$

$$-\frac{dx}{d\tau} = k_2 K_p \left[\begin{array}{c} CH_2-CH_2 \\ \diagdown O \diagup \end{array}\right] [HNO_3].$$

Orig. art. has: 1 figure and 5 tables.

SUB CODE: 07 / SUBM DATE: 31Mar65 / ORIG REF: 005 / OTH REF: 004

Card 2/2 ##

LEBEDEV, N. N.

"On a Method of Solution of Some Problems of the Diffraction Theory," Acta Phys., 1, No.3, 1939

LEBEDEV, N. N.

"On the Application of Inversion Formulae to the Solution of Certain Problems of Electrodynamics," Zhur. Eksper. i Teoret. Fiz., 9, No.6, 1939

Industrial Inst., Leningrad

LEBEDEV, N. N.

1340

621.315.611:621.3.015.51

Times involved in the thermal breakdown of solid insulants. GRUNBERG, G. A., KONTOROVITSCH, M. I., AND LEBEDEV, N. N. J. Phys., U.S.S.R., 5, 5-6, pp. 339-356, 1941.--The time characteristic for the thermal breakdown of capacitors is studied theoretically. The mathematical expression of the problem is found to consist partly of non-linear differential equations, the solutions of which are obtained by an approx. method. For certain types of capacitors a simple solution is obtained which enables the influence of the heating process, dimensions and the properties of the solid dielectric to be calculated. The approx. solution is compared with certain accurate solutions obtained by numerical integration of the original differential equations and found to be in agreement.

A. M. T.

Lebedev, N. N. Équations intégrales pour les solutions périodiques de l'équation

$$u''+(a_0+a_1\cos 2x+a_2\cos 4x)u=0.$$

C. R. (Doklady) Acad. Sci. URSS (N.S.) 52, 391–394 (1946).

The differential equation of the title admits the following four solutions: (1) even solutions of period π, (2) even solutions of period 2π, (3) odd solutions of period π, (4) odd solutions of period 2π. These solutions are studied in connection with those of the integral equation

$$u(x)=\lambda\int_0^{\pi/2}K(x,s)u(s)ds,$$

in which the kernel K is of the type

$$K(x,s)=\varphi(x)\varphi(s)F(\cos 2x+\cos 2s).$$

In particular, if $\varphi(x)$ is one of the functions 1, $\cos x$, $\sin x$, $\sin 2x$, and $F(t)$ satisfies

$$F''+t^{-1}(2m+1)F'-(\frac{1}{4}a_2+\frac{1}{4}a_1/t)F=0.$$

with $m=0, \frac{1}{2}, \frac{1}{2}, 1$, respectively, then the solutions of the integral equations are those of the differential equation as specified above, provided F is expressed in terms of hypergeometric functions,

$F(t)=\exp(-t\,a_2 \ldots) {}_1F_1(\frac{1}{2}+m-\frac{1}{4}a_1 \ldots; 2m+1; \ldots)$ [illegible]

It is shown that [illegible] Mathieu functions. For $a_1=\pm 2(p-m+\frac{1}{2})$ [illegible] which p is any nonnegative integer [illegible] Whittaker [Proc. Edinburgh Math. Soc. 33, 14–23 (1915)] and Ince [Proc. London Math. Soc. (2) 23, 6–74 (1925), in particular, p. 55] are obtained.

[Reviewer's note: The author is wrong in stating that, except when $a_1=a_2=0$, the differential equation does not admit two independent periodic solutions for any given set a_0, a_1, a_2. From general theory even two independent periodic solutions of period π may sometimes exist; this is the case for the equation under consideration, as is evident from numerical work of Kotter and Kotowski, Z. Angew. Math. Mech. 23, 149–155 (1943); these Rev. 5, 203.]

C. J. Bouwkamp (Eindhoven).

Source: Mathematical Reviews, Vol 8, No. 5

LEBEDEV, N. N.

Lebedev, N. N. Sur un formule d'inversion. C. R. ~~(Doklady) Acad.~~ Sci. URSS (N.S.) 52, 655–658 (1946).

Let $K_\nu(t)$ denote Macdonald's Bessel function [cf. Watson, Treatise on the Theory of Bessel Functions, Cambridge University Press, 1922, p. 78]. The author proves the following formula:

$$xf(x) = 2\pi^{-2}\int_0^\infty K_{i\tau}(x)\tau \sinh \pi\tau d\tau \int_0^\infty K_{i\tau}(\xi)f(\xi)d\xi,$$

subject to the (sufficient) conditions that $x^2f(x)$ and $xf'(x)$ are integrable-L in $(0, \infty)$. *A. C. Offord.*

Source: Mathematical Reviews, 1948, Vol 9, No. 1

LEBEDEV, N.N.

Lebedev, N. N. **Solution of Dirichlet's problem for hyperboloids of revolution.** Appl Math Mech [Akad Nauk SSSR. Prikl Mat. Mech] 11, 251-258 (1947). (Russian. English summary)

This paper deals with boundary value problems that can be solved by the use of Mehler's transformation defined by

$$\Phi(\tau) = \int_1^\infty f(\xi) P_{-\frac{1}{2}+i\tau}(\xi)\,d\xi, \qquad 0 \leqq \tau < \infty. \tag{I}$$

where $P_n(\xi)$ is Legendre's function of degree n. A typical case considered is Dirichlet's problem for hyperboloids of revolution. Through the application of the transformation (I) to Laplace's equation the problem is reduced to the solution of an ordinary differential equation, which is obtained in terms of Legendre's functions of complex degree. The solution of the original problem is then found by the inversion of the integral in (I) by means of the known formula

$$f(\xi) = \int_0^\infty \tau \tanh \tau\pi P_{-\frac{1}{2}+i\tau}(\xi)\Phi(\tau)\,d\tau$$

[F. G. Mehler, Math. Ann. 18, 161-194 (1881); V. A. Fock, C. R. (Doklady) Acad. Sci. URSS (N.S.) 39, 253-256 (1943); these Rev. 5, 181]. *H. P. Thielman* (Ames, Iowa)

Source: Mathematical Reviews, 1948, Vol 9, No. 1

LEBEDEV, N.N.

Lebedev, N. N. [illegible] the representation of an arbitrary [illegible]

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R000929020009-0"

PROCESSES AND PROPERTIES INDEX

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537.212/.214 : 517.918

1010. **Application of singular integral equations to the problem of the distribution of charge on thin non-closed surfaces.** Lebedev, N. N. *J. Tech. Phys., USSR*, **18**, 775–84 (*June*, 1948) *In Russian*.—It is shown that the solution of the electrostatic problem of a disciform conductor, of conductors having the shape of thin spherical segments or of planes of circular cross-section leads to the consideration of a singular integral equation. The solution of this integral equation is given and, as special cases, the solutions of the above-mentioned problems are obtained. The method represents a non-ambiguous and direct approach to the problem considered, at the same time reducing the amount of calculation required. A.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

LEBEDEV, N.N.

Lebedev, N. N. An integral equation for the periodic solutions of the equation $u'' + (a_0 + a_1 \cos 2x + a_2 \cos 4x)u = 0$. Doklady Akad. Nauk SSSR (N.S.) 59, 25–28 (1948). (Russian)

In a preceding article [C. R. (Doklady) Acad. Sci. URSS (N.S.) 52, 391–394 (1946); these Rev. 8, 269] the author proved that the periodic solutions of the above equation satisfy an integral equation

$$u(x) = \lambda \int K(x, s) u(s) ds$$

[illegible] any symmetric periodic solution of a partial [illegible] equation of the second order; furthermore he [illegible] certain types of functions K with the prescribed [illegible]. In the present paper he investigates other kernels of the form

$$K = \exp\{(a_2/2)\cos 2x [illegible]\} F(\sigma),$$

[illegible] are simple trigonometrical functions and [illegible] is a [illegible] function. Eight new different kernels are [illegible].

[illegible] results for Mathieu's equation follow in particular [illegible] [illegible] the kernel reduces [illegible] to a Hermite polynomial [illegible] the periodic solutions [illegible] which [illegible] a trigonometric polynomial.

[illegible] (Montevideo).

Source: Mathematical Reviews,

LEBEDEV, N. N.

Lebedev, N. N. Some singular ... connected with integral representations ... physics. Doklady Akad. Nauk SSSR (N.S.) 65, 621 ... (1949). (Russian)

... Theory of Bessel Functions, Cambridge, 1944 ...

Source: Mathematical Reviews.

LEBEDEV, N. N.

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Lebedev, N. N. Parseval's formula for the Mehler-Fok integral transform. Doklady Akad. Nauk SSSR (N.S.) 68, 445–448 (1949). (Russian)

The Mehler-Fok transform formulae are

$$G(\tau)=\int_1^\infty g(x)p(x,\tau)dx,\quad g(x)=\int_0^\infty G(\tau)p(x,\tau)d\tau$$

with $p(x,\tau)=(\tau\tanh\pi\tau)^{\frac{1}{2}}P_{-\frac{1}{2}+i\tau}(x)$ [Mehler, Math. Ann. 18, 161–194 (1881); Fok, C. R. (Doklady) Acad. Sci. URSS (N.S.) 39, 253–256 (1943); these Rev. 5, 181]. It is shown that if $g(x)$ is any real function, $g(x)x^{-\frac{1}{2}}\log(1+x)$ is $L(1,\infty)$ and $g(x)$ is $L^2(1,\infty)$, then

$$\int_0^\infty[G(\tau)]^2d\tau=\int_1^\infty[g(x)]^2dx.$$

J. L. B. Cooper (London).

Source: Mathematical Reviews. Vol 11 No. 3

LEBEDEV, N.N. USSR 7505

Leningrad Physicotechnical Institute, USSR Academy of Sciences. Analog to the Parseval Theorem for an integral transformation, 653-6.

SO: Akademiya Nauk, SSR, Doklady Vol. 68, No. 4, 1 Oct 1949
(Army BID Files)

LEBEDEV, N.N

Lebedev, N. N. Some integral representations for products of sphere functions. Doklady Akad. Nauk SSSR (N.S.) 73, 449–451 (1950). (Russian)

Representations for products of associated Legendre functions of the form $P_n^m \cos\theta \, P_n^m$ [illegible] and [illegible] whose integrand [illegible] of order $(m-\frac{1}{2})$ and [illegible] of $(n+\frac{1}{2})\psi$, ψ being the variable of integration.

J. L. B. Cooper (Cardiff)

Source: Mathematical Reviews, Vol 12 No. 5

LEBEDEV, N.N.

PHASE I TREASURE ISLAND BIBLIOGRAPHICAL REPORT AID 423 - I

BOOK Call No.: AF617188

Author: LEBEDEV, N. N.
Full Title: SPECIAL FUNCTIONS AND THEIR APPLICATIONS
Transliterated Title: Spetsial'nyye funktsii i ikh prilozheniya

Publishing Data
Originating Agency: None
Publishing House: State Publishing House of Technical and Theoretical Literature; Physico-Mathematical Library for Engineers
Date: 1953 No. pp.: 379 No. of copies: 6,000
Editorial Staff: None

Text Data
Coverage: The book is a compilation presenting a systematic exposition of fundamentals of the principal special functions with certain of their applications to concrete problems of mathematical physics and engineering. The subject matter is covered by the table of contents.

The text was thoroughly compared with: 1) A Course of Modern Analysis (1943) by E. T. Whittaker and G. N. Watson, which apparently is the chief source of the book; 2) The Theory of Functions (1932) by E. C. Titchmarsh; 3) Operational Calculus (1950) by B. Van der Poll and H. Bremmer, and other English texts. Nothing new was found

since the text seems to be a reference book and brings in known mathematical statements and theories without elaborating on the details and deductions. This may be assumed from the author's frequent advice to the reader to study the original. The practical applications of the theoretical deductions given by the author in the text, as well as the examples, seem to have an original character. The author recommends as an introduction to the understanding of the fundamentals of his book volume 3 of the Course of Higher Mathematics by V. I. Smirnov. This course seems to be one of the main textbooks in the Universities of the USSR.

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APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R000929020009-0"

Spetsial'nyye funktsii ikh prilozheniya AID 423 - I

PAGES

Boundary problem for a parabolic cylinder. Application to quantum mechanics. Exercises.

Literature 377-379

Purpose: The book is dedicated to scientific workers and research engineers, who are in need of mathematical computations.

Facilities: None

No. of Russian and Slavic References: 15 Russian (after 1939) out of a total of 52, mainly non-Russian as shown in the literature list. In addition, numerous footnotes and references at the end of every chapter.

Available: A.I.D., Library of Congress.

LEBEDEV, N. N.

PA 242T63

USSR/Mathematics - Elasticity Problems Jan/Feb 53

"Method of Solution of the General Biharmonic Problem for a Rectangular Region With Specified Values Along the Boundary of the Function and Its Normal Derivative," G. A. Grinberg, N. N. Lebedev, and Ya. S. Ufland, Leningrad Polytech Inst

"Priklad Matemat i Mekhan" Vol 17, No 1, pp 73-86

Presents recently proposed method for solution of subject problem, suited for application to two-dimensional theory of elasticity and to a bent thin elastic plate with fixed boundary. Constructs such system in a rectangular region with arbitrary ratio of sides. Examples and tables given. Received 19 Sep 52.

242T63

Grinberg, G. A., Lebedev, N. N., Skal'skaya, I. P., and Uflyand, Ya. S. Wave problem for a parabolic mirror. Doklady Akad. Nauk SSSR (N.S.) 95, 961-963 (1954). (Russian)

Leningrad Phys.-Tech. Inst., AS USSR

A critical survey of papers on the diffraction of electromagnetic waves by a parabolic cylinder, viz., [1] P. S. Epstein, Dissertation, Munich, 1914; [2] P. S. Epstein, Enzyk. Math. Wiss., Bd. 5_1, Teubner, Leipzig, 1915, p. 511; [3] W. Magnus, Jber. Deutsch. Math. Verein. 50, 140–161 (1940); [4] W. Magnus, Z. Physik 118, 343-356 (1941) [these Rev. 2, 56; 9, 125]. Limitations of the method used in [1] and [2] are mentioned (convergence of the series in part of space only). Lack of a detailed proof in [3] for the fact that the solution satisfies the radiation condition is emphasized and a full proof is announced. An expansion in terms of products of parabolic cylinder functions of integral (positive and negative) order is derived for the field produced by a line source in the focal line of the cylinder. The proof is sketched and based on [3]. The result is used for filling a gap in [4] by showing that the diffracted wave in [4] satisfies the condition of being finite on the focal line. The series for the diffracted wave found by the authors is shown to converge only in a finite part of the interior of the cylinder.

W. Magnus (New York, N. Y.).

LEBEDEV, N.N.; SKAL'SKAYA, I.P.; UFLYAND, Ya.S.; AKILOV, G.P., redaktor;
VOLOHOK, K.M., tekhnicheskiy redaktor.

[Collection of problems in mathematical physics] Sbornik zadach
po matematicheskoy fizike. Moskva, Gos.izd-vo tekhniko-teoret.
lit-ry, 1955. 420 p. (MLRA 8:10)
(Mathematical physics)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R000929020009-0"

LEBEDEV, N.N. (Leningrad).

On significance domains of functionals in certain classes of analytic functions. Usp.mat.nauk 11 no.5:56 S-O '56. (MLRA 10:2)
(Functions, Analytic)

LEBEDEV, N.N.

I-5

Category : USSR/Radiophysics - Radiation of Radio Waves. Antennas

Abs Jour : Ref Zhur - Fizika, No 2, 1957, No 4488

Author : Grinberg, G.A., Lebedev, N.N., Skal'skaya, I.P., Uflyand, Ye.S.

Inst : Leningrad Physicotechnical Institute, Academy of Sciences, USSR, Leningrad

Title : Electromagnetic Field of Linear Radiator, Located Inside and Ideally-Conducting Parabolic Screen

Orig Pub : Zh. eksperim. i teor. fiziki, 1956, 30, No 3, 528-543

Abstract : Analysis of the problem of the reflection of an electromagnetic wave from a conducting screen, shaped like a parabolic cylinder. The source of oscillation is considered to be linear and placed inside the cylinder, and the current in the source is $I = I_0 e^{iwt}$ where I_0 = const is the amplitude of the current and ω is the angular frequency. It is shown that the results obtained in previously-published works are not sufficiently well founded. An accurate solution of the problem is given and is reduced to the solution of an equation with separable variables; the fundamental difficulty lies in a suitable choice of the partial solutions,

Card : 1/3

Category : USSR/Radiophysics - Radiation of Radio Waves. Antennas I-5

Abs Jour : Ref Zhur - Fizika, No 2, 1957, No 4488

satisfying all the requirements, including the radiation condition at infinity and the correct behavior at the source. The author considers first the case when the source of oscillation is located along the focal line. The partial solution to the problem is found in the form $u = A_{\nu}^{(1)}(\alpha) \cdot B_{\nu}^{(1)}(\beta)$, where u is the secondary electric field and (α, β) are the parabolic coordinates; $A_{\nu}^{(1)}(\alpha)$ and $B_{\nu}^{(1)}(\beta)$ are expressed in terms of degenerate hypergeometric functions; the real part of the parameter ν varies in the range $-1/2 < R\{\nu\} < 0$. It is possible to assume that the general solution is of the form

$$u(\alpha, \beta) = \int_{-\delta-i\infty}^{-\delta+i\infty} C(\nu) A_{\nu}^{(1)}(\alpha) \cdot B_{\nu}^{(1)}(\beta)\, d\nu$$

where $0 < \delta < 1/2$. On the surface of the parabolic screen $(\beta = \beta_0)$, the electric field E vanishes, i.e., $u = -E_0$, where E_0 is the field of the source. This leads to the equation

$$\int_{-\delta-i\infty}^{-\delta+i\infty} C(\nu) A_{\nu}^{(1)}(\alpha) B_{\nu}^{(1)}(\beta_0)\, d\nu = -E_0$$

The unknown function $C(\nu)$ is thus found by expanding the field of

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Category : USSR/Radiophysics - Radiation of Radio Waves. Antennas I-5

Abs Jour : Ref Zhur - Fizika, No 2, 1957, No 4488

the source in the integral in terms of the functions $A^{(1)}(\alpha)$. It is proved, that the dolution obtained is a general solution of the problem. It is shown that for the case of high frequencies, the solution assumes a form corresponding to the geometrical-optics approximation. The solution is generalized to include the case of arbitrary location of the source along the axis of the cylinder. Bibliography, 10 titles.

Card : 3/3

LEBEDEV, N. N.

AUTHOR: Lebedev, N.N. 57-9-24/40

TITLE: The Electrostatic Field of an Immersion Electron Lens Consisting of Two Membranes. (Elektrostaticheskoye pole immersionnoy elektronnoy linzy, sostavlennoy iz dvukh diafragm)

PERIODICAL: Zhurnal Tekhn. Fiz., 1957, Vol. 27, Nr 9, pp. 2097-2104 (USSR)

ABSTRACT: An exact computation of the field of an electron lens is given. The lens is formed by two parallel surfaces with round holes (radius a), which are located at a distance of 2b from each other. It is shown that the distribution of the potential on the lens axis can be expressed in quadratures by an auxiliary function, which is a solution of a one-dimensional integral equation of the second degree with a continuous kernel. A method for the solution of this integral equation is described, and the results obtained when calculating some conditions geometrical dimensions are mentioned. The method developed here can be used for the calculation of fields of lenses with a complicated construction consisting of parallel, round membranes. There are 2 tables, 1 figure and 1 Slavic reference.

ASSOCIATION: Leningrad Physical-Technical Institute AN USSR (Leningradskiy fiziko-tekhnicheskiy institut AN USSR)

SUBMITTED: March 27, 1957

AVAILABLE: Library of Congress

Card 1/1

20-114 3-17/60

AUTHOR: Lebedev, N. N.

TITLE: The Distribution of Electricity on a Thin Parabolic Segment (Raspredeleniye elektrichestva na tonkom paraboloidal'nom segmente)

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol. 114, Nr 3, pp 513-516 (USSR)

ABSTRACT: The present paper employs a new method for determining the exact solution of the problem mentioned in the title. It is shown that the density of the charge-distribution onto the surface of the conductor and its capacity can be expressed by an auxiliary function with the use of quadratures. This auxiliary function is a solution of a unidimensional Fredholmian integral equation with steady (continuous ?) kernel. When the surface has a small curvature a simple formula is obtained for the capacity of the segment in the form of a series according to the powers of a small parameter. To the surface of the parabolic segment the equation $z/h = (r/R) - (R/2h)$ $(0 \leqslant r \leqslant R)$ applies, the significance of the quantities R and h being illustrated by a figure. The problem of the free distribution of electricity is reduced to

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20-114 3-17/60

The Distribution of Electricity on a Thin Parabolic Segment

the determination of the potential $u = u(r, z)$ which satisfies the Laplace equation $\Delta u = 0$ and the boundary conditions $u|_S = V$, $u|_{\infty} = 0$. At first a system of parabolic coordinates (α, β) is introduced. The equation of the surface (S) in the new coordinates has the form $\beta = \beta_0 = R/\sqrt{2h}$, $0 \leqslant \alpha \leqslant a = \sqrt{2h}$.

The solution of the problem is here sought in the form

$$u = \int_0^{\infty} (A(\lambda)(I_0(\lambda\beta)/I_0(\lambda\beta_0))J_0\ (\lambda\alpha)d \qquad (0 \leqslant \beta \leqslant \beta_0)$$

$$u = \int_0^{\infty} (A(\lambda)(K_0(\lambda\beta)/K_0(\lambda\beta_0))J_0\ (\lambda\alpha)d \qquad (\beta_0 < \beta < \infty)$$

where $A(\lambda)$ is an unknown function. $J_0(x)$, $I_0(x)$ and $K_0(x)$ are cylindrical functions. The function defined by these equations formally satisfies the Laplace equation and is continuous in the entire space including the surface $\beta = \beta_0$. Then a pair of integral equations for $A(\lambda)$ and an ansatz for the solution of these integral equations are given. The simplest solution is obtained for the capacity of the segment. A series development is given for small values of the parameter $h/R = \rho$. The method of solution suggested here may also be extended to the case that the conductor with the form of a parabolic segment

Card 2/3

20-114-3-17/60

The Distribution of Electricity on a Thin Parabolic Seg ment

is in any external field with symmetry round the axis. There are 1 figure and 5 references, 2 of which are Slavic.

ASSOCIATION: Physico-Technical Institute AN USSR (Fiziko-tekhnicheskiy institut Akademii nauk SSSR)

PRESENTED: January 14, 1957, by M. A. Leontovich, Member of the Academy

SUBMITTED: January 7, 1957

Card 3/3

AUTHORS: Lebedev, N.N., Uflyand, Ya.S. (Leningrad) SOV/40-22-3-4/21

TITLE: An Axial Symmetric Problem of Compression of an Elastic Layer (Osesimmetrichnaya kontaktnaya zadacha dlya uprugogo sloya)

PERIODICAL: Prikladnaya matematika i mekhanika, 1958, Vol 22, Nr 3, pp 320 - 326 (USSR)

ABSTRACT: In elasticity theory it is in general supposed for the solution of compression problems that the body standing under the influence of any rigid punch forms an elastic half space. In the present paper now the considerably more difficult problem is investigated in which a punch of axial symmetrical form influences on an elastic layer. It is assumed that the punch is loaded by a pure axial force. Furthermore the friction between the punch and the layer as well as the friction between the layer and the base plate which is assumed to be rigid is neglected. But it is pointed out that this neglect can also be omitted.

With the method developed in the paper it is possible to express by an auxiliary function the sought displacements of the elastic medium and the stresses occurring therein. This auxiliary function is the solution of a Fredholm integral

An Axial Symmetric Problem of Compression of an Elastic Layer

SOV/40-22-3-4/21

equation with a continuous symmetric kernel.
For the special case of a punch with a plane basis several numerical results are given in form of tables. Also for the case of a punch without plane basis and under unsymmetric load the possibilities for the solution are considered but not carried out in detail.
There are 3 tables, 1 figure, and 4 references, 3 of which are Soviet, and 1 is English.

SUBMITTED: July 3, 1957

Card 2/2

57-28-4-22/39

AUTHORS: ~~Lebedev, N. N.~~, Skal'skaya, I. P.

TITLE: The Axially Symmetrical Electrostatic Problem Concerning a Conductor With a Shape of a Semi-Infinite Tube With Thin Walls (Osesimmetrichnaya elektrostaticheskaya za= dacha dlya provodnika, imeyushchego formu polubeskonech= noy truby s tonkimi stenkami)

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1958, Vol. 28, Nr 4, pp. 792-800 (USSR)

ABSTRACT: The distribution of the potential near a conductor, - with a shape of a thin-walled semi-infinite cylinder (tube) which is brought into any electrostatic field $\vec{E}_0$ axially symmetrical with regard to the axis of the cy= linder is wanted. An exact solution of this problem is given. In this connection a new method for the solution of a class of static problems is developed. This method represents an analog to the methods employed in the in= vestigation of the similar class of boundary problems of the diffraction theory. These boundary problems occur

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The Axially Symmetrical Electrostatic Problem Concerning a Conductor With a Shape of a Semi-Infinite Tube With Thin Walls

57-28-4-22/39

in connection with the problems in the investigation of the acoustic and electromagnetic waves from an open orifice of cylindrical and flat tubular conductors (References 1-13). As an example for the employment of the general method the solution of the problem of the determination of the field of a point-charge at the axis of a conducting semi-infinite tube is given here. There are 6 figures and 14 references, 12 of which are Soviet.

ASSOCIATION: Leningradskiy fiziko-tekhnicheskiy institut AN SSSR (Leningrad Physical-Technical Institute, AS USSR)

SUBMITTED: November 1, 1957

Card 2/2

AUTHOR: Lebedev, N. N. 57-28-6-29/34

TITLE: The Electrostatic Field at the Edge of a Flat Condenser With a Dielectric Spacer (Elektrostaticheskoye pole u kraya ploskogo kondensatora s dielektricheskoy prokladkoy)

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1958, Vol. 28, Nr 6, pp. 1330 - 1339 (USSR)

ABSTRACT: In the present paper a flat electrostatic work concerning the field distribution in a dielectric plate at the edges of which electrodes in form of thin parallel plates are fitted (figure 1) is discussed. It is assumed that the space surrounding the plate is filled with a medium with a different dielectric constant. On the condition that the electrode width 21 is several times greater than the electrode thickness 2h, the reciprocal influence exercised by the edges can be disregarded. The problem is then reduced to the determination of the field near the edge of the semi-infinite flat condenser (figure 2). In a special case in which the medium is homogeneous ($\varepsilon_1 = \varepsilon_2$) the solution of the problem can be carried out by the method of conformal transformation. The solution of

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this problem for a general case, which appears to have been found for the first time in the course of the present work, is based upon the accurate solution of paired integral equations to which this problem is actually reduced. The method developed can be used for the efficacious solution of other boundary problems of mathematical physics with mixed boundary conditions. When solving paired integral equations the function $A(\lambda)$ is considered to be the limiting value (at $\mu \longrightarrow 0$) of the function of the complex variable $A(w)$, which is determined by

$$A(w) = \frac{-VK_{-}(-i\alpha)}{2\pi i K_{-}(w)(w + i\alpha)} \qquad (16)$$

The derivative

$$A(w)K(w) = -\frac{VK_{-}(-i\alpha)K_{+}(w)}{2\ i(w + i\alpha)}$$

 then represents a function that is regular in the plane with a

The Electrostatic Field at the Edge of a Flat Condenser 57-28-6-29/34
With a Dielectric Spacer

section along the positive axis. The function A(w) which was determined by (16) satisfies the investigated equations. For points located at a distance from the edge of the electrode a simple asymtotic formula can be derived:

$$\left.\frac{u}{V}\right|_{\substack{y=h \\ x\to-\infty}} \simeq \frac{1}{\pi}\,\frac{1-x}{1+x}\,\frac{h}{|x|}$$

The author thanks A. Ya. Chernyak for his calculations.

Appendix: Properties of the function $f(z)$.

The function $f(z)$ corresponds to the interrelation

$$f\left(-\frac{iz}{\pi}\right)+f\left(\frac{iz}{\pi}\right) = \ln(1 + xe^{\mp 2z}).$$

The sign $\mp$ is selected in accordance with $Re(z) \gtrless 0$.

There are 5 figures, 1 table and 5 references, 3 of which are Soviet.

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The Electrostatic Field at the Edge of a Flat Condenser 57-28-6-29/34
With a Dielectric Spacer

ASSOCIATION: Leningradskiy fiziko-tekhnicheskiy institut AN SSSR (Leningrad Institute of Physics and Technology, AS USSR)

SUBMITTED: July 4, 1957

1. Capacitors—Electrical properties 2. Electrostatic generation 3. Mathematics

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S/057/60/030/05/02/014
B012/B056

AUTHORS: Lebedev, N. N., Skal'skaya, I. P.

TITLE: Electrostatic Field of an Electron Lens Consisting of Two Coaxial Cylinders

PERIODICAL: Zhurnal tekhnicheskoy fiziki, 1960, Vol. 30, No. 5, pp. 472 - 479

TEXT: An exact solution of the problem of field distribution in a lens consisting of two coaxial cylinders is given. The method employed for this purpose is based upon the solution of pairs of integral equations by means of the theory of the functions of one complex variable. On the basis of the formulas obtained, the distribution of the potential along the lens axis is calculated for various ratios between the inner and the outer cylinder radii. Results are given in Table 2 and in the form of curves in Fig. 2. A. Ya. Chernyak carried out the numerical computations of this investigation. There are 2 figures, 2 tables, and 2 Soviet references.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN SSSR Leningrad (Institute of Physics and Technology of the AS USSR, Leningrad)

~~Card 1/2~~

Electrostatic Field of an Electron Lens Consisting of Two Coaxial Cylinders

S/057/60/030/05/02/014
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SUBMITTED: July 16, 1958

Card 2/2

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AUTHOR: Lebedev, N. N.

TITLE: Expansion of arbitrary function in an integral over the squares of the Macdonald function with imaginary sign

PERIODICAL: Sibirskiy matematicheskiy zhurnal, v. 3, no. 2, 1962, 213-222

TEXT: The following expansion theorem is proved: when f(x) fulfills the conditions

$x^{-1/2}f(x)\in L(0,1)$, $x^{1/2}F(x)\in L(1,\infty)$ (1), it can be expanded as

$$\int_x^\infty f(y)\,dy = \frac{4}{\pi^2}\int_0^\infty \tau \operatorname{sh}\pi\tau K_{i\tau}^2(x)\,d\tau \int_0^\infty f(y)\,[I_{i\tau}(y) + I_{-i\tau}(y)]\,K_{i\tau}(y)\,dy, \qquad (2)$$

for any $x>0$, where $I_\nu(x)$ and $K_\nu(x)$ are modified cylindrical functions. The probably possible substitution of the less stringent condition $f(x)\in L(0,\infty)$ for the conditions (1) would complicate the proof considerably. The integrals over y are Lebesgue integrals, those over τ are the limits of the corresponding Riemann integral over the interval $(0,\tau)$ at $\tau\to\infty$. When f(x) fulfills the conditions (1), the integral representation

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Expansion of arbitrary function ...

$F(\tau) = L_\tau(f) = \int_0^\infty f(x)\left[I_{i\tau}(x) + I_{-i\tau}(x)\right]K_{i\tau}(x)dx$, $0 \leqslant \tau < \infty$ for almost every $x > 0$ can be inverted with the inversion formula

$f(x) = M_x(F) = -(4/\pi^2)d/dx \int_0^\infty F(\tau)\tau \operatorname{sh}\pi\tau K^2_{i\tau}(x)d\tau$. The estimations

$$|I_\nu(y) K_\nu(x)| = O(1)|\nu|^{-\frac{1}{2}}\left(\frac{y}{x}\right)^{R(\nu)},$$
$$|\nu| \geqslant 1,\ |\arg \nu| \leqslant \frac{\pi}{2};\ 0 < y \leqslant x; \qquad (9),$$
$$R(\nu) \geqslant \frac{1}{2},\ 0 < y \leqslant x,$$

$$|I_\nu(y) K_\nu(x)| = O(1)\frac{(1+x)^{\frac{1}{2}}}{\nu},$$
$$R(\nu) \geqslant \frac{1}{2};\ 0 < y \leqslant x. \qquad (10),$$

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B125/B102

Expansion of arbitrary function ...

$$|[I_{i\tau}(x) + I_{-i\tau}(x)]\,K_{i\tau}(x)| = O(1)\int_0^\infty \left(2x\,\mathrm{sh}\,\frac{t}{2}\right)^{-\frac{1}{2}} dt = O(1)\,x^{-\frac{1}{2}}, \qquad (11),$$

$$-\infty < \tau < \infty;\ x > 0.$$

and (12)

$$|I_\nu(y)\,K_\nu(x)| = O(1)\,T^{-1},$$

$$\nu = \sigma \pm iT,$$

$$0 \leqslant \sigma \leqslant \frac{1}{2},\ T \to \infty,$$

for the cylindrical functions follow from the integral representation

$$I_\nu(y)\,K_\nu(x) = \frac{1}{2}\int_{\ln\frac{x}{y}}^\infty J_0(\omega)\,e^{-\nu t}\,dt, \qquad (3).$$

$$R(\nu) > -\frac{1}{4};\ x > 0,\ y > 0,$$

$$\omega = \omega(t) = (2xy\,\mathrm{ch}\,t - x^2 - y^2)^{\frac{1}{2}},$$

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Expansion of arbitrary function ... S/199/62/003/002/001/004
B125/B102

The variables x,y lie within the finite interval (a,b); $0 < a < b < \infty$. By substituting special functions for f(x) in (2), interesting representations can be obtained:

$$e^{-2x} = \frac{4}{\pi}\int_0^\infty \tau \, \mathrm{th}\, \pi\tau K_{i\tau}^2(x)\, d\tau,$$

$$J_0\left(2x\,\mathrm{sh}\,\frac{\alpha}{2}\right) = \frac{4}{\pi^2}\int_0^\infty \mathrm{sh}\,\pi\tau \sin\alpha\tau K_{i\tau}^2(x)\, d\tau, \quad \alpha > 0. \qquad (27).$$

There are 2 figures and 4 references: 3 Soviet and 1 non-Soviet. The reference to the English-language publication reads as follows: E. W. Hobson, The theory of functions of a real variable, v. II, Dover Publications Inc., New York, 1957.

SUBMITTED: July 12, 1960

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10.6000 1327

30998
S/124/61/000/009/022/058
D234/D303

AUTHORS: Lebedev, N.N. and Uflyand, Ya.S.

TITLE: 3-dimensional problem of the theory of elasticity for an infinite body weakened by two plane round holes

PERIODICAL: Referativnyy zhurnal. Mekhanika, no. 9, 1961, 1, abstract 9 V6 (Tr. Leningr. politekhn. in-ta, 1960, no. 210, 39-49)

TEXT: The authors consider the axially symmetrical problem of the theory of elasticity for an infinite space containing two plane round holes (with the centers on one straight line) of the same radius, situated on parallel planes z = 0, z = -2h. On the surfaces of a hole, equal axially symmetrical distributions of normal (σ_z) and tangential (τ_{zr}) stresses are given and it is supposed that at the points of a hole belonging to its different sides the stresses are equal in magnitude and opposite in direction. Owing

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3-dimensional problem... S/124/61/00./009/022/058
D234/D303

to the symmetry with respect to the plane $z = -h$ the problem is reduced to considering an elastic half-space $z > -h$ with the boundary conditions

$$(\sigma_z)_{z=0} = \sigma(r), \quad (\tau_{rz})_{z=0} = \tau(r)$$

$$(w)_{z=-h} = 0, \quad (\tau_{rz})_{z=-h} = 0$$

and the appropriate conditions at infinity. The solution in the regions $-h \leqslant z < 0$ and $0 \leqslant z \leqslant \infty$ is expressed in terms of harmonic Papkovich-Neuber functions, whose determination is reduced to two systems of even integral equations. These systems are reduced to a system of Fredholm integral equations with regular kernels. Unknown functions in the latter are determined numerically, and in terms of these, the quantities which are essential for the applications can be expressed in closed and comparatively simple form (a formula for σ_z at $z = 0$, $r > a$ is given). Numerical results are given for the case of uniform dilatation at infinity ($\sigma(r) = -q$, $\tau(r) = 0$).
[Abstracter's note: Complete translation]

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29808

S/020/61/140/006/002/030
C111/C444

16.4500 16.3400

AUTHORS: Lebedev, N. N., Pergamentseva, E. D.

TITLE: Integral equations for the periodic solutions of Whittaker's equation

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 140, no. 6, 1961, 1252-1254

TEXT: The equation

$$\frac{d^2u}{dx^2} + \left[A - (p+1)\, l \cos 2x + \frac{1}{8}\, l^2 \cos 4x\right] u = 0 \qquad (1)$$

possesses as is well-known periodic solutions (period π or 2π) for every choice of p and l at a suitable choice of A. Such periodic solutions satisfy the integral equations

$$u(x) = \lambda \int_{-\pi}^{\pi} K(x,y)\, u(y)\, dy \qquad (2)$$

the kernels of which satisfy

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Integral equations for the periodic . . .

$$\frac{\partial^2 K}{\partial x^2} - \frac{\partial^2 K}{\partial y^2} + \left[- (p+1)f(\cos 2x - \cos 2y) + \frac{1}{8} l^2 (\cos 4x - \cos 4y) \right] K = 0. \quad (3)$$

The author searches explicite expressions for k(x,y) by the set-up

$$K = e^{-1/4 l(\cos 2x + \cos 2y)} g. \quad (4)$$

If g is searched further on in the form

$$g = \varphi (\cos x \cos y) \psi (\sin x \sin y) \quad (6)$$

then one obtains for even integrals of (1) with the period π:

$$K = e^{-1/4 l(\cos 2x + \cos 2y)} \times$$

$$\times F\left(-\frac{\nu}{2}, \frac{1}{2}; l \cos^2 x \cos^2 y\right) F\left(\frac{\nu - p}{2}, \frac{1}{2}; -l \sin^s x \sin y\right); \quad (7)$$

for even integrals with the period 2π

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Integral equations for the periodic

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$$K = e^{-1/4\,l(\cos 2x + \cos 2y)} \cos x \cos y \times$$

$$\times F\left(\frac{1-\nu}{2}, \frac{3}{2}; l \cos^2 x \cos^2 y\right) F\left(\frac{\nu-p}{2}, \frac{1}{2}; -l \sin^2 x \sin^2 y\right); \quad (8)$$

for uneven integrals with the period π

$$K = e^{-1/4\,l(\cos 2x+\cos 2y)} \sin 2x \sin 2y \times$$

$$\times F\left(\frac{1-\nu}{2}, \frac{3}{2}; l \cos^2 x \cos^2 y\right) F\left(\frac{\nu-p+1}{2}, \frac{3}{2}; -l \sin^2 x \sin^2 y\right); \quad (9)$$

and for uneven integrals with the period 2π

$$K = e^{-1/4\,l(\cos 2x + \cos 2y)} \sin x \sin y \times$$

$$\times F\left(-\frac{\nu}{2}, \frac{1}{2}; l \cos^2 x \cos^2 y\right) F\left(\frac{\nu-p+1}{2}, \frac{3}{2}; -l \sin^2 x \sin^2 y\right) \quad (10)$$

where ν is a free parameter, $F(\alpha, \gamma; z)$ is a degenerated hypergeometric function. If g is searched in the shape of

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$g = \cos^k (x-y) \varphi (\cos 2x + \cos 2y)$; $k = 0,1,2,\ldots$ (11)

then one obtains

$$K = e^{-1/4\, l(\cos 2x + \cos 2y)} \cos^k (x-y)\, F\left(\frac{k-p}{2}, k+1; \frac{1}{2} l (\cos 2x + \cos 2y)\right),$$
$$k = 0,1,2,\ldots \quad (12)$$

For even k the kernels (12) correspond to solutions of (1) with the period π, for uneven k they correspond to solutions with the period 2π. For $k = p$ (p being a positive integer) (12) gives the kernel of Whittaker (Ref. 1: E. T. Whittaker, Proc. Edinb. Math. Soc., 33, 14 (1915)).

If $p = 2n$, $n = 0,1,2,\ldots$, and if in (7) one puts $\nu = 2m$, $m = 0,1,\ldots,n$, then one obtains

$$K = e^{-1/4 l(\cos 2x + \cos 2y)} H_{2m}(\sqrt{l} \cos x \cos y)\, H_{2(n-m)}(\sqrt{-l} \sin x \sin y), \quad (13)$$

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R000929020009-0"

where $H_n(z)$ is an Hermitian polynomial. If simultaneously $l \to 0$, $p \to \infty$ and $pl \to 2q$ q being finite, then (1) turns into a Matthieu equation and (7) - (10) into the following kernels:

$$\mathrm{ch}\,(2\sqrt{q}\,\sin x \sin y),\ \cos x \cos y\ \mathrm{ch}\,(2\sqrt{q}\,\sin x \sin y)$$
$$\cos x \cos y\ \mathrm{sh}\,(2\sqrt{q}\,\sin x \sin y),\ \mathrm{sh}(2\sqrt{q}\,\sin x \sin y)\ . \qquad (16)$$

Several more limiting processes are considered. There are 2 Soviet-bloc and 2 non-Soviet-bloc references. The 2 reference to English-language publications read as follows: E. T. Whittaker. Proc. Edinb. Math. Soc., 33, 14 (1915); E. L. Ince, Proc. Lond. Math. Soc. (2), 23, 56 (1924).

ASSOCIATION: Fiziko-Tekhnicheskiy institut Akademii nauk SSSR (Physicotechnical Institute of the Academy of Sciences USSR)

PRESENTED: May 27, 1961, by V. J. Smirnov, Academician

SUBMITTED: May 13, 1961

Card 5/5

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R000929020009-0"

KUZNETSOV, F.O.; LEBEDEV, N.N.; MODEL', I.Sh.; TSUKERMAN, V.A.

Using coaxial photocells for recording high-speed luminous phenomena. Prib.i tekh.eksp. 6 no.5:132-134 S-O '61. (MIRA 14:10)
(Photoelectric measurements)

35794

S/120/62/000/001/042/061
E192/E382

24.6800

AUTHORS: Lebedev, N.N. and Model', I.Sh.

TITLE: Electronic photo-recorder

PERIODICAL: Pribory i tekhnika eksperimenta, no. 1, 1962, 169 - 172

TEXT: The instrument can be used to investigate various light phenomena (either internally or externally stimulated) at time-base speeds from 10 - 280 km/s. The light from the investigated object is projected by an input objective onto the cathode of an electron-optical converter (EOC) through a slot situated near the external glass wall of the photocathode. The light image is converted into an electronic image by the photocathode. The latter is focused and accelerated by the electrostatic field of an electron lens which is formed by the photocathode and a diaphragm. It is then transmitted to the output fluorescent screen of the converter, where it is converted again into a visible image and can be photographed. During the transfer from the photocathode to the screen, the electron beam

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Electronic photo-recorder

carrying the image passes through the electric fields of a number of deflector plates of the EOC and it can easily be controlled. Control of the exposure time is performed by two pairs of electrodes which form an electronic shutter operated by a shutter-pulse generator. This generator is triggered at the required time instant by the investigated phenomenon by employing one of the standard methods (Ref. 1 - L.V. Al'tshuler, K.K. Krupnikov, B.N. Ledenev, V.I. Zhuchikhin, M.I. Brazhnik - Zh. eksperim. i teor. fiz., 1958, 34, 874). The signal of the converter is shaped into suitable triggering pulses and these actuate the shutter-pulse generator and the time-base. A circuit diagram of the photo-recorder is shown in Fig. 5 (1 - triggering input; 2 - shutter plates of the EOC; 3 - two horizontal plates of the EOC). The electron-optical converter is of the type ПИМ-3М (PIM-ZM) with an Sb-Cs photocathode having a sensitivity of 70 μA/lumen (Ref. 13 - M.M. Butslov - Progress of Scientific Photography [Uspekhi nauchn. fotogr.], v.6, 1959, 76). The triggering signal from the investigated effect actuates the shaping circuit which, in turn, actuates the

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Electronic photo-recorder S/120/62/000/001/042/061 E192/E382

shutter-pulse generator and the time-base. The first tube of the circuit of Fig. 5 is triggered by the first signal from the converter and all the following pulses have no effect on it. After completing the investigation, the tube is extinguished by means of the key K. The positive pulse produced at the cathode of the first tube is applied to the anode and the first grid of the second tube and the grid of the fourth tube. A shutter pulse having an amplitude of +450 V is thus produced at the anode of the second tube. This is amplified by the third tube, whose output is 1.8 kV; this is then applied to the shutter plates of the EOC. Simultaneously with the shutter, the pulse from the cathode of the first tube actuates the fourth tube where a negative pulse having an amplitude of 3.5 kV is obtained at the anode. This is applied to the horizontal deflection plates of the EOC. This time-base generator makes it possible to control the velocity of the electron beam within the range from 10 - 280 km/sec. The instrument is also provided with facilities for shifting the image along the horizontal axis of the converter. This is done by applying a direct voltage to one

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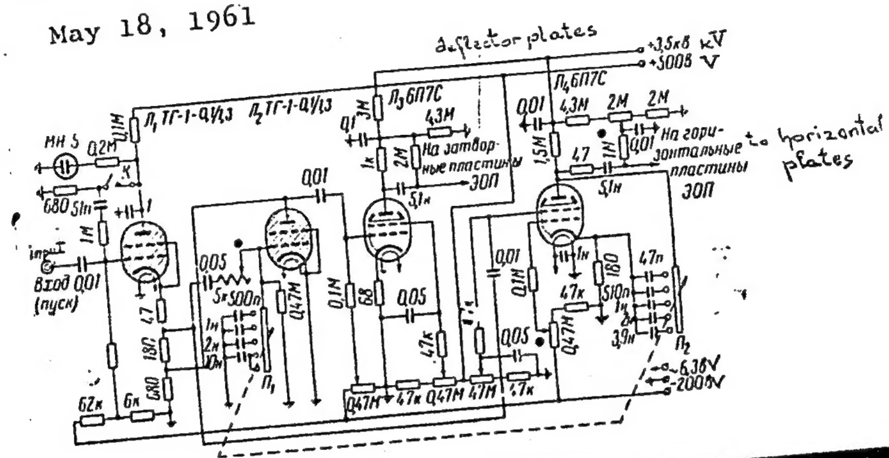
of the horizontal plates, the magnitude of this voltage being adjusted by the 2 MΩ potentiometer (see Fig. 5). The authors express their gratitude to V.A. Vanchurin for help in the work and in writing this paper. There are 7 figures.

SUBMITTED: May 18, 1961

Fig. 5:



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35370
S/057/62/032/003/018/019
B119/B104

24.2400 (1057,1147,1385)

AUTHORS: Lebedev, N. N., and Skal'skaya, I. P.

TITLE: The force acting on a conducting sphere in the field of a plane capacitor

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 32, no. 3, 1962, 375-378

TEXT: The authors calculate the charge of a conducting sphere which is in contact with the plate of a plane capacitor and the force acting upon it. It has been assumed that $a \ll h$ (a = radius of the globule, h = distance between the capacitor plates). The potential between the capacitor plates u was determined by integrating the Laplace equation:

$$u = E_0 a \sqrt{\alpha^2 + \beta^2} \int_0^\infty \frac{\operatorname{sh} \nu (\beta_0 - \beta)}{\operatorname{sh} \nu \beta_0} J_0(\nu \alpha) d\nu , \quad 0 < \beta < \beta_0$$

(E_0 = applied homogeneous field, $J_0(x)$ = Bessel function). The charge of the sphere was calculated by means of this relation:

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